



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/852,651	05/11/2001	Ludovic Fleury	Q64436	5236

7590 09/25/2003

SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC
Suite 800
2100 Pennsylvania Avenue, N.W.
Washington, DC 20037-3213

EXAMINER

HUG, ERIC J

ART UNIT

PAPER NUMBER

1731

DATE MAILED: 09/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No.	Applicant(s)	
	09/852,651	FLEURY ET AL.	
	Examiner	Art Unit	
	Eric Hug	1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 May 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-9 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-6 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsumura et al (US 4,406,518). Matsumura discloses a method of making an optical fiber based on variations in the core diameter of a preform without altering the preform itself. The refractive index distribution of a core-clad preform is first measured. The fiber is then drawn from the preform based on this measurement and on predetermined characteristics. The fiber is drawn based on a drawing ratio of $(d/a)^2$ given in column 3, lines 50-55, whereby d is the radius of the core of the preform and a is the radius of the core of the optical fiber to be obtained. This method is applicable to fibers drawn from preforms having any refractive index distribution. See also the passages in column 7, lines 16-24 and in column 9, lines 1-9, which further describe the relationship between the preform and the formed fiber.

2. Claims 1, 4, and 6-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Harding (US 4,793,840). Harding discloses a method for drawing an optical fiber from a preform whereby variations in the preform diameter affect how the resulting fiber is drawn. A preform is fed into a furnace at a first predetermined rate, from which a fiber is drawn by a

Art Unit: 1731

capstan at a second predetermined rate to produce a fiber of predetermined diameter. The diameter of the drawn fiber is sensed, and the sensor produces a signal representative of the difference between the actual diameter and the predetermined diameter. The signal is used to control the preform feed drive rate and/or the speed of the capstan that draws the fiber so that the actual diameter of the fiber meets the predetermined diameter of the fiber.

Harding measures the diameter of the drawn fiber to control the drawing rate of the fiber. This itself is not the same as monitoring properties of the preform and control the drawing rate therefrom. However, Harding states in column 2, lines 54-68, that the preform will not have a constant diameter throughout its length. An increased diameter portion of the preform entering the furnace will increase the diameter of the fiber out of the furnace (at constant drawing rate). Harding also states in column 3, lines 7-13, that the capstan speed is calculated based on measurements of the preform such as diameter. Thus, short term and long term control of the production process is established, the short term control being that resulting from the measured diameter of the optical fiber (which is measured more frequently) and the long term control being that resulting from the measured diameter of the preform. Therefore, Harding teaches drawing the optical fiber and controlling its diameter based on variations in the diameter of the preform.

With regards to the values of claims 7 and 8, Harding states that it is important that the capstan speed not deviate more than 5% from its predetermined values. For a nominal fiber diameter of 125 microns, this would result in a change in diameter of less than 6 microns. Thus, it is possible for the diameter change to read on the claimed ranges.

Art Unit: 1731

3. Claims 1, 2, and 4-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Dudderar et al (US 4,102,661). Dudderar discloses a method for drawing an optical fiber from a preform whereby the drawdown zone is monitored for caustic rays and the parameters governing the drawing process are then controlled based on measurements of the caustic rays. Light is made to travel in the axial direction of the preform to the drawdown zone where it is refracted out of the preform and/or light is reflected off the drawdown zone. From this refracted and/or reflected light, a caustic ray is formed (see column 3, lines 3-27 for details). Dudderar then determines what he calls a caustic boundary. The angles at which this caustic boundary appears is a function of the optical properties within the optical fiber preform. From the measurements of caustic rays, one can determine the geometrical and optical properties of the preform (such as diameter and refractive index) and consequently the geometrical and optical properties of the resulting optical fiber drawn from the preform. See column 3, lines 35-55.

With respect to the diameter tolerances of claims 7-8, these are explicitly disclosed by Dudderar. For a nominal 100 micron diameter fiber (column 4, line 24) and tolerances to less than one percent (column 1, lines 15-17, 31-34), this would result in a diameter change of less than one micron.

Art Unit: 1731

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 4-6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe (US 6,502,429). Abe disclose a method for controlling the drawing of optical fibers based on optical measurements of a length of fiber taken immediately after drawing. The outer diameter of the fiber is controlled based on measurements of properties characteristic of the chromatic dispersion of the fiber, namely the cutoff wavelength or the mode field diameter. The control method compensates for varying properties of the of the preform itself due to processing inaccuracies.

In the method, first the refractive index profile of the preform is measured. Based on this measurement an initial value for the fiber diameter is determined. The fiber is drawn according to this initial value diameter. Once drawn, the optical measurements on the fiber are performed. The measurements are compared to target optical properties, and based on this comparison, a new target diameter is determined if the optical measurements are outside of desired tolerances. The fiber is then drawn to the new target diameter. The steps of measuring the optical properties of the fiber, determining the target diameter of the fiber based on the measurements, and drawing the fiber at the new target diameter are reiterated as needed.

Abe measures the optical fibers of the drawn fiber to control the drawing rate of the fiber. This itself is not the same as monitoring properties of the preform and control the drawing rate

Art Unit: 1731

therefrom. However, the steps of first measuring the optical properties of the preform to set an initial target diameter amounts to long term control of the drawing process, whereby the short term control is that resulting from the measured properties of the optical fiber. It would be obvious to one skilled in the art that measurements of the properties of the preform will be performed more than once, particularly when tolerances for optic fiber properties are exceeded and a new initial target diameter is necessary. Therefore, Harding teaches drawing the optical fiber and controlling its properties based on variations in the properties of the preform.

Allowable Subject Matter

Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not teach or suggest modifying the diameter of the optical fiber so that its variation is in the opposite direction to a measured variation in the diameter of the preform core. Matsumura given above teaches a different relationship for modifying the diameter of the optical fiber in response to a measured diameter of the preform core.

Art Unit: 1731

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Fleming, Jr. et al (US 6,553,790) discloses modifying the core diameter of a preform based on initial measurements of the core profile and comparing the measurements to a desired value of the core profile.

Dabby et al (US 4,294,601) discloses a means for automatically controlling the production of a preform based on continuous weight and diameter measurements of the preform.

Shimuzu et al (US 6,131,414) discloses a method for drawing a mother ingot into a preform for optical fibers. The method compensates for variations in the properties of the mother ingot to yield a uniform preform and ultimately a uniform optical fiber. A measurement of the profile of the refractive index of the mother ingot is first made, from which a core-to-clad diameter ratio is determined, and then the intended outer diameter of the preform is set based on whether or not the core-to-clad diameter ratio meets a predetermined requirement. Drawing of the preform from the mother ingot is performed according to the intended outer diameter.

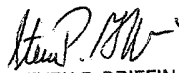
Art Unit: 1731

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Hug whose telephone number is 703 308-1980. The examiner can normally be reached on Monday through Friday, 9:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 703 308-1164. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0651.

jeh


STEVEN P. GRIFFIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700